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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,322	07/25/2003	Raghu Nath Bhattacharya	14388.28	2290
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PRESTON GATES & ELLIS LLP 1900 MAIN STREET, SUITE 600 IRVINE, CA 92614-7319			EXAMINER BARTON, JEFFREY THOMAS	
			ART UNIT	PAPER NUMBER
			1753	
DATE MAILED: 12/18/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/627,322

Applicant(s)

BHATTACHARYA, RAGHU NATH

Examiner

Jeffrey T. Barton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 22 September 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) 1 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>20050922</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Election/Restrictions***

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claim 1, drawn to a photovoltaic cell, classified in class 136, subclass 262.
  - II. Claims 2-11, drawn to methods of preparing films and photovoltaic devices, classified in class 136, subclass 262.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the solar cell can be made by another method, such as vapor deposition of the semiconductor layers.

3. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Dr. Michelle Glasky on 6 December 2006 a provisional election was made with traverse to prosecute the invention of group II,

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claims 2-11. Affirmation of this election must be made by applicant in replying to this Office action. Claim 1 is withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

### ***Information Disclosure Statement***

5. The information disclosure statement (IDS) submitted on 22 September 2005 included two copies of Form PTO-892 documents mailed to Applicant during the prosecution of the parent Application Serial No. 09/829,730, as well as a copy of an initialed Form PTO/SB/08A from the prosecution of this earlier application. These are not proper IDS submissions. However, the references listed on the improper IDS documents have been listed on the enclosed Form PTO-892.

### ***Claim Objections***

6. Claim 9 is objected to because it is a substantial duplicate of claim 5.

7. In claim 10 at lines 11 and 12, the two recitations of the term "negative-type" should be changed to "n-type".

8. In claim 10 at lines 11-12, the term "electro-deposition" is objected to because there is no support for such a deposition method in the specification. Paragraph [0031] teaches "chemical bath deposition". The Examiner suggests amendment of the claim to recite this term.

Appropriate correction is required.

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***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 2-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhattacharya et al (US Patent No. 5,730,852) in view of either Yukawa et al or Lowenheim.

Bhattacharya et al disclose a method of preparing a copper indium gallium diselenide (CIGS) film comprising: providing a glass substrate with molybdenum layer (Column 2, lines 64-67), providing an electrodeposition bath having the elements required (Column 4, lines 56-58), placing the substrate in the bath to form a CIGS layer (Column 2, lines 64-67), and adjusting the composition of the CIGS layer by addition of indium by physical vapor deposition. (Column 3, lines 4-8)

Bhattacharya et al do not explicitly disclose using a buffered electrodeposition bath, although they discuss the importance of avoiding hydroxide formation in the bath via electrolysis of water. (Column 4, lines 1-6)

Yukawa et al teach the electrodeposition of copper indium sulfide semiconductor using a buffered electrodeposition bath. (Introduction and Experimental sections)

Lowenheim teaches the general use of a buffer for controlling the pH of an electrodeposition bath. (Pages 120-121 and the section "pH and Plating" on pages 516-517)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Bhattacharya et al by including a buffer to control the pH of the plating solution, as taught by Yukawa et al, because buffers control the pH of the solution, and would prevent the formation of excess hydroxide ion, which was recognized by Bhattacharya et al as undesirable. (Column 4, lines 1-6) A buffer is a conventional means of controlling the pH of a solution, and its use for this purpose would have been obvious to a skilled artisan.

Alternatively, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Bhattacharya et al by including a buffer to control the pH of the plating solution, as taught by Lowenheim et al, because Lowenheim et al teach that control of the pH of a plating solution is an important consideration, and that buffers can be used to provide such control. (Pages 120-121 and the section "pH and Plating" on pages 516-517) Particularly since Bhattacharya recognizes that production of excess hydroxide in the bath is to be avoided (Column 4,

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lines 1-6), a skilled artisan would have recognized the desirability of using a buffer to maintain the pH at suitable levels.

12. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhattacharya et al (US Patent No. 5,730,852) in view of Lowenheim, Chen et al, and Biter et al.

Bhattacharya et al disclose a method of preparing a copper indium gallium diselenide (CIGS) photovoltaic cell comprising: providing a glass substrate and applying a molybdenum layer onto this substrate (Column 2, lines 64-67); providing an electrodeposition bath having the elements required (Column 4, lines 56-58); placing the substrate in the bath to form a CIGS layer (Column 2, lines 64-67); adjusting the composition of the CIGS layer by addition of indium by physical vapor deposition (Column 3, lines 4-8); depositing an n-type layer of CdS onto the CIGS layer (Column 5, lines 24-26); depositing a first zinc oxide layer onto the CdS layer by RF sputtering (Column 5, lines 32-37); depositing an aluminum oxide doped zinc oxide layer onto the first zinc oxide layer (Column 5, lines 37-41); applying a nickel/aluminum contact layer to the aluminum oxide doped zinc oxide layer (Column 5, lines 45-49); and depositing a magnesium fluoride antireflective layer onto the contact layer. (Column 5, lines 52-54)

Bhattacharya et al do not explicitly disclose using a buffered electrodeposition bath, although they discuss the importance of avoiding hydroxide formation in the bath via electrolysis of water. (Column 4, lines 1-6) In addition, they do not explicitly disclose

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forming the molybdenum layer by RF sputtering, nor do they disclose depositing the CdS layer by electrodeposition.

Lowenheim teaches the general use of a buffer for controlling the pH of an electrodeposition bath. (Pages 120-121 and the section "pH and Plating" on pages 516-517)

Chen et al teach a method for forming I-III-VI solar cells comprising using RF sputtering, among other methods, to deposit a molybdenum layer. (Column 3, lines 39-45; Column 6, lines 19-21)

Biter et al teach a method of forming a solar cell comprising applying an n-type CdS layer to a p-type layer by using electrodeposition. (Claim 3)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Bhattacharya et al by including a buffer to control the pH of the plating solution, as taught by Lowenheim et al, because Lowenheim et al teach that control of the pH of a plating solution is an important consideration, and that buffers can be used to provide such control. (Pages 120-121 and the section "pH and Plating" on pages 516-517) Particularly since Bhattacharya recognizes that production of excess hydroxide in the bath is to be avoided (Column 4, lines 1-6), a skilled artisan would have recognized the desirability of using a buffer to maintain the pH at suitable levels.

It would also have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the method of Bhattacharya et al by using RF sputtering to deposit the molybdenum layer, as taught by Chen et al, because Chen et



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al teach that the molybdenum layer in this type of solar cell can be deposited using several substantially equivalent techniques, including RF sputtering.

It would also have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the method of Bhattacharya et al by depositing the CdS layer by electrodeposition, as taught by Biter et al, because Bhattacharya et al teach that "thin film solar cells made by electrodeposition techniques are generally much less expensive" (Column 1, lines 64-66), providing financial motivation for such modification.

13. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhattacharya et al (US Patent No. 5,730,852) in view of Yukawa et al, Chen et al, and Biter et al.

The teachings of Bhattacharya et al, Chen et al, and Biter et al are as described above in paragraph 10. The teaching of Yukawa et al is as described above in paragraph 9.

The motivations for modification of the method of Bhattacharya et al in view of these references are as presented above in paragraphs 9 and 10.

### ***Conclusion***

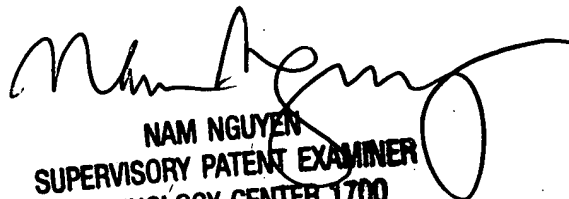
14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571) 272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JTB  
8 December 2006

  
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